PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-045755
(43)Date of publication of application : 15.02.2000

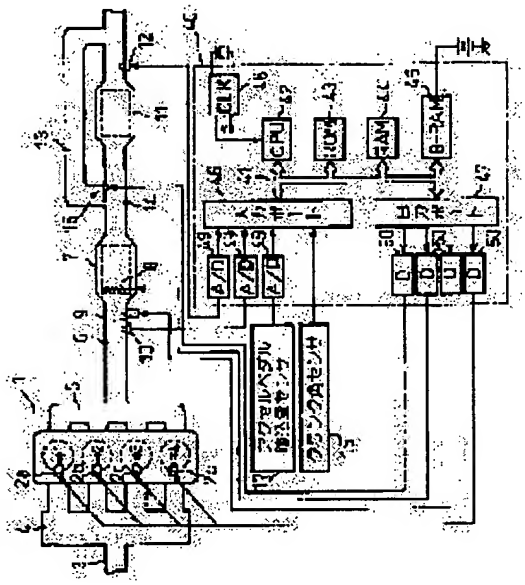
(51)Int.Cl. F01N 3/20
F01N 3/02
F01N 3/08
F01N 3/24

(21)Application number : 10-213140
(22)Date of filing : 28.07.1998

(71)Applicant : TOYOTA MOTOR CORP
(72)Inventor : HIROTA SHINYA
TANAKA TOSHIAKI
OHASHI NOBUMOTO
ITO KAZUHIRO
IWASAKI EIJI
YOSHIZAKI KOJI

(54) EXHAUST EMISSION CONTROL DEVICE FOR INTERNAL COMBUSTION ENGINE

(57)Abstract:
PROBLEM TO BE SOLVED: To prevent the lowering of the NOx absorbing ability of the NOx absorbing agent in case of recycling a catching filter by providing a flow-in preventing means for preventing the in-flow of the exhaust gas into the NOx absorbing agent through a catching means in case of eliminating the exhaust fine grains caught by the catching means so as to recycle the catching means.
SOLUTION: During the operation of an engine, the exhaust fine grains included in the exhaust gas is caught by a catching filter 7, and NOx in the exhaust gas is absorbed by the NOx absorbing agent 11. Acidity concentration of the exhaust gas is lowered by a method of increasing the quantity of fuel injection from a fuel injection valve at the predetermined period so as to discharge the NOx absorbed by the NOx absorbing agent 11. When the exhaust pressure is higher than the predetermined pressure and the catching filter 7 needs to be recycled, a switching valve 15 is controlled so that the exhaust gas is flowed into a bypass passage 13, and the catching filter 7 is heated by a heater 8 so as to incinerate the exhaust fine grains, but the exhausted NOx is discharged while bypassing the NOx absorbing agent 11 so as to prevent the in-flow of the NOx into the NOx absorbing agent 11.



LEGAL STATUS

[Date of request for examination] 17.04.2000
[Date of sending the examiner's decision of rejection]
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number] 3228232

CLAIMS

[Claim(s)]
[Claim 1] An internal combustion engine's exhaust emission control device characterized by providing the following. The playback means for removing the exhaust-air particle by which uptake was carried out to said uptake means in the exhaust emission control device of the internal combustion engine which has arranged the uptake means for carrying out uptake of the exhaust-air particle to the flueway of the upstream of said NOx absorbent, and reproducing this uptake means, while arranging the NOx absorbent which emits NOx absorbed when the air-fuel ratio of the flowing exhaust gas was Lean, NOx was absorbed and the oxygen density in the flowing exhaust gas fell to an internal combustion engine's flueway An inflow prevention means to prevent that the exhaust gas which passed this uptake means when this uptake means was reproduced flows into said NOx absorbent
[Claim 2] Said inflow prevention means is the exhaust emission control device of the internal combustion engine according to claim 1 characterized by controlling said change-over valve so that exhaust gas flows into a bypass path, when it branches from the flueway between said uptake means and said NOx absorbents, the change-over valve for making exhaust gas flow into the bypass path which bypasses this NOx absorbent, or said NOx absorbent or a bypass path is provided and said uptake means is reproduced.
[Claim 3] While arranging the NOx absorbent which emits NOx absorbed when the air-fuel ratio of the flowing exhaust gas was Lean, NOx was absorbed and the oxygen density in the flowing exhaust gas fell to an internal combustion engine's flueway The exhaust emission control device of the internal combustion engine characterized by providing an emission means to emit the exhaust air particle by which uptake was carried out to said uptake means in the state of an exhaust air particle in the exhaust emission control device of the internal combustion engine which has arranged the uptake means for carrying out uptake of the exhaust air particle to the flueway of the upstream of said NOx absorbent.
[Claim 4] The exhaust emission control device of the internal combustion engine according to claim 3 characterized by providing the uptake means of the addition for carrying out uptake of the exhaust air particle emitted to the flueway of the downstream of said NOx absorbent by said emission means.
[Claim 5] The exhaust emission control device of the internal combustion engine which has arranged the uptake means for carrying out uptake of the exhaust air particle to the flueway of the upstream of said NOx absorbent while having arranged the NOx absorbent which emits NOx absorbed when the air-fuel ratio of the flowing exhaust gas characterized by providing the following was Lean, NOx was absorbed and the oxygen density in the flowing exhaust gas fell to an internal combustion engine's flueway The playback means for removing the exhaust air particle by which uptake was carried out to said uptake means, and reproducing this uptake means They are theoretical air fuel ratio or the Air Fuel Ratio Control means made rich about the air-fuel ratio of the exhaust gas which flows into said NOx absorbent when this uptake means is reproduced.
[Claim 6] The exhaust emission control device of an internal combustion engine according to claim 5 characterized by controlling said change-over valve so that exhaust gas bypasses said uptake means and flows into said NOx absorbent, when it has the following and said uptake means is reproduced by said playback means. Said Air Fuel Ratio Control means is the bypass path which branched from the flueway of the upstream of said uptake means, bypassed this uptake means, and was connected to the flueway of the downstream of said uptake means. The change-over valve for making exhaust gas flow into either said uptake means or a bypass path

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to an internal combustion engine's exhaust emission control device.
[0002]
[Description of the Prior Art] The exhaust emission control device which equipped an internal combustion engine's flueway with the NOx absorbent which emits NOx absorbed when the air-fuel ratio of the flowing exhaust gas was Lean, NOx was absorbed and the oxygen density in the flowing exhaust gas fell is indicated by JP,9-53442,A. An NOx absorbent is used with the internal combustion engine whose air-fuel ratio of exhaust gas is Lean in most engine operating range. An NOx absorbent purifies NOx by HC or CO which HC or CO was supplied into exhaust gas, and was supplied while emitting NOx absorbed if the oxygen density in exhaust gas falls. Moreover, the above-mentioned exhaust emission control device equips the flueway of the upstream of an NOx absorbent with the uptake filter for carrying out uptake of the exhaust air particle (diesel particulate).
[0003] By the way, an NOx absorbent will also absorb SOx in exhaust gas. For this reason, the NOx absorptance of an NOx absorbent declines. On the other hand, SOx sticks to the exhaust air particle by which uptake was carried out to the uptake filter. Therefore, it is desirable for maintaining the NOx absorptance of an NOx absorbent highly to arrange an uptake filter to the upstream of an NOx absorbent like the above-mentioned exhaust emission control device.
[0004] By the way, since an exhaust air particle accumulates on an uptake filter, an uptake filter flows to a lifting and exhaust gas stops being able to flow to the downstream of an uptake filter easily in blinding. So, in the above-mentioned exhaust emission control device, the exhaust air particle by which uptake was carried out to the uptake filter at the stage set beforehand is burned, and the uptake filter is reproduced.
[0005]
[Problem(s) to be Solved by the Invention] When an uptake filter is reproduced, SOx which was sticking to the exhaust air particle is emitted from an uptake filter. An NOx absorbent will also absorb SOx, when the air-fuel ratio of the flowing exhaust gas is Lean. Therefore, SOx emitted from the uptake filter will be absorbed by the NOx absorbent, and the NOx absorptance of an NOx absorbent will decline. Then, the purpose of this invention is to prevent the fall of the NOx absorptance of the NOx absorbent at the time of uptake filter playback.
[0006]
[Means for Solving the Problem] NOx is absorbed when the air-fuel ratio of the flowing exhaust gas is Lean most according to invention of an eye, in order to solve the above-mentioned technical problem. While arranging the NOx absorbent which emits NOx absorbed when the oxygen density in the flowing exhaust gas fell to an internal combustion engine's flueway In the exhaust emission control device of the internal combustion engine which has arranged the uptake means for carrying out uptake of the exhaust air particle to the flueway of the upstream of said NOx absorbent When the playback means and this uptake means for removing the exhaust air particle by which uptake was carried out to said uptake means, and reproducing this uptake means are reproduced, an inflow prevention means to prevent that the exhaust gas which passed this uptake means flows into said NOx absorbent is provided. Therefore, when an uptake means is reproduced, SOx discharged from an uptake means does not flow into an NOx absorbent.
[0007] In order to solve the above-mentioned technical problem, according to the second invention, it sets to invention of an eye most. The bypass path which said inflow prevention means branches from the flueway between said uptake means and said NOx absorbents, and bypasses this NOx absorbent, The change-over valve for making exhaust gas flow into either said NOx absorbent or a bypass path is provided, and when said uptake means is reproduced, said change-over valve is controlled so that exhaust gas flows into a bypass path.
[0008] NOx is absorbed when the air-fuel ratio of the flowing exhaust gas is Lean according to the third invention, in

order to solve the above-mentioned technical problem. While arranging the NOx absorbent which emits NOx absorbed when the oxygen density in the flowing exhaust gas fell to an internal combustion engine's flueway In the exhaust emission control device of the internal combustion engine which has arranged the uptake means for carrying out uptake of the exhaust air particle to the flueway of the upstream of said NOx absorbent, an emission means to emit the exhaust air particle by which uptake was carried out to said uptake means in the state of an exhaust air particle is provided. Therefore, SOx flows into an NOx absorbent in the condition of having stuck to the exhaust air particle by which uptake was carried out with the uptake means.

[0009] In order to solve the above-mentioned technical problem, according to the fourth invention, in the third invention, the uptake means of the addition for carrying out uptake of the exhaust air particle emitted to the flueway of the downstream of said NOx absorbent by said emission means is provided. Therefore, uptake of the exhaust air particle which passed the NOx absorbent is carried out by the additional uptake means.

[0010] In order to solve the above-mentioned technical problem, according to the fifth invention, it sets to the third invention. While arranging the NOx absorbent which emits NOx absorbed when the air-fuel ratio of the flowing exhaust gas was Lean, NOx was absorbed and the oxygen density in the flowing exhaust gas fell to an internal combustion engine's flueway In the exhaust emission control device of the internal combustion engine which has arranged the uptake means for carrying out uptake of the exhaust air particle to the flueway of the upstream of said NOx absorbent When the playback means and this uptake means for removing the exhaust air particle by which uptake was carried out to said uptake means, and reproducing this uptake means are reproduced, theoretical air fuel ratio or the Air Fuel Ratio Control means made rich is provided for the air-fuel ratio of the exhaust gas which flows into said NOx absorbent. Therefore, when an uptake means is reproduced, theoretical air fuel ratio or rich exhaust gas flows [an air-fuel ratio] into an NOx absorbent.

[0011] In order to solve the above-mentioned technical problem, according to the sixth invention, it sets to the fifth invention. Said Air Fuel Ratio Control means The bypass path which branched from the flueway of the upstream of said uptake means, bypassed this uptake means, and was connected to the flueway of the downstream of said uptake means, The change-over valve for making exhaust gas flow into either said uptake means or a bypass path is provided, and when said uptake means is reproduced by said playback means, said change-over valve is controlled so that exhaust gas bypasses said uptake means and flows into said NOx absorbent.

[0012]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail with reference to a drawing. The internal combustion engine which adopted the exhaust emission control device of the first operation gestalt of this invention was shown in drawing 1 . The internal combustion engine of the first operation gestalt is a diesel power plant whose air-fuel ratio in exhaust gas is Lean in most engine operating range. However, the air-fuel ratio in exhaust gas can also adopt the first operation gestalt as the so-called lean burn engine which is Lean by most engine operating range other than a diesel power plant. In drawing 1 , 1 shows an engine body, and **1-**4 show the gas column formed in the engine body 1. each -- the fuel injection valves 2a-2d for injecting a fuel (a hydrocarbon or HC) are attached in this gas column gas column **1-**4. an internal combustion engine's inhalation-of-air path 3 -- an inlet manifold 4 -- minding -- each -- it connects with gas column **1-**4. moreover -- each -- gas column **1-**4 are connected to a flueway 6 through an exhaust manifold 5.

[0013] The uptake filter 7 is arranged in a flueway 6 as an uptake means for carrying out uptake of the exhaust air particle (diesel particulate) discharged by the internal combustion engine. The uptake filter 7 has the mesh which has an eye small enough although uptake of the exhaust air particle is carried out, and carries out uptake of the exhaust air particle by letting exhaust gas pass in this mesh. Moreover, in case the uptake filter 7 is reproduced in the upper edge of the uptake filter 7 so that it may mention later, the heating heater 8 is attached in it as a heating means for heating the upper edge of the uptake filter 7. In addition, the heating heater 8 may be attached in the central part or down-stream edge of the uptake filter 7 by request. Furthermore, in case the uptake filter 7 is reproduced in the flueway 6 of the upstream of the uptake filter 7 so that it may mention later, the air-injection valve 9 for supplying air to the uptake filter 7 is attached in it. Moreover, a pressure sensor 10 is attached in the flueway 6 of the upstream of the air-injection valve 9 as a pressure detection means for detecting the pressure in the flueway 6 of the upstream of the uptake filter 7 (exhaust gas pressure). Although mentioned later for details, a pressure sensor 10 functions also as a playback decision means to judge whether the uptake filter 7 should be reproduced.

[0014] The NOx absorbent 11 as an NOx absorption means to absorb NOx in exhaust gas is arranged in the flueway 6 of the downstream of the uptake filter 7. The NOx absorbent 11 emits NOx absorbed when the air-fuel ratio of the flowing exhaust gas was Lean, NOx was absorbed and the oxygen density in the flowing exhaust gas fell. The air-fuel ratio sensor 12 for detecting the air-fuel ratio of exhaust gas is attached in the flueway 6 of the downstream of the NOx

absorbent 11.
[0015] From the flueway 6 between the uptake filter 7 and the NOx absorbent 11, the bypass path 13 which bypasses the NOx absorbent 11 branches, and the flueway 6 of the downstream of the NOx absorbent 11 is joined. Moreover, the change-over valve 15 for making exhaust gas flow into either the NOx absorbent 11 or the bypass path 13 is attached in a part for the tee 14 of the bypass path 13 from the flueway 6 between the uptake filter 7 and the NOx absorbent 11.
[0016] The internal combustion engine of the first operation gestalt possesses an electronic control 40. An electronic control 40 consists of a digital computer, and CPU (microprocessor)42, ROM (read only memory)43, RAM (random access memory)44 and B-RAM (backup RAM)45 which were mutually connected through the bidirectional bus 41, input port 46, an output port 47, and the clock generation circuit 48 are provided. A pressure sensor 10 and the air-fuel ratio sensor 12 are connected to input port 46 through corresponding A-D converter 49. Moreover, the internal combustion engine of the first operation gestalt possesses the crank angle sensor 16 for detecting the crank angle of a crankshaft, and this crank angle sensor 16 is connected to the direct-input port 46. With the first operation gestalt, an engine rotational frequency is computed based on this crank angle. Furthermore, an internal combustion engine possesses the amount sensor 17 of accelerator pedal treading in for detecting the amount of treading in of an accelerator pedal (not shown), and this amount sensor 17 of accelerator pedal treading in is connected to input port 46 through corresponding A-D converter 49. On the other hand, an output port 47 is connected to each fuel injection valves 2a-2d, the air-injection valve 9, the heating heater 8, and a change-over valve 15 through the drive circuit 50.
[0017] Next, actuation of the exhaust emission control device of the first operation gestalt is divided into the actuation under NOx purification processing, and the actuation under uptake filter regeneration, and is explained. Actuation of the exhaust emission control device under NOx purification processing is explained first. The air-fuel ratio in the exhaust gas in most under NOx purification is Lean, and the change-over valve 15 is controlled so that exhaust gas flows into the NOx absorbent 11. In the uptake filter 7, uptake of the exhaust air particle of exhaust gas is carried out first. Next, NOx in exhaust gas is absorbed in the NOx absorbent 11. Therefore, in most under NOx purification, the exhaust gas which does not contain an exhaust air particle and NOx is discharged by the downstream of the NOx absorbent 11. Moreover, in NOx purification, by whether the amount of the fuel injected from a fuel injection valve for an engine drive at the stage set beforehand is made [many], or an engine expansion line injects an additional fuel from a fuel injection valve like an engine exhaust air line in addition to the fuel injection for an engine drive, the acidity concentration of exhaust gas is lowered and NOx absorbed is emitted from the NOx absorbent 11. The fuel contained in exhaust gas at this time, i.e., HC, and CO return and purify NOx. Therefore, the exhaust gas which does not contain an exhaust air particle and NOx in this case, either is discharged by the downstream of the NOx absorbent 11. In addition, the amount of HC which should be supplied to the NOx absorbent 11, or CO is an amount by which all HC is consumed in a reduction operation of the NOx absorbent 11, and HC or CO is not emitted to the downstream of the NOx absorbent 11. With the first operation gestalt, when the air-fuel ratio detected by the air-fuel ratio sensor 12 is rich, HC or CO to supply is lessened, and when it is Lean, HC to supply is made [many]. Moreover, HC or CO functions as a reducing agent for purifying NOx. moreover, the account of a top -- NOx absorbed by the NOx absorbent 11 based on the engine load which computed the stage set beforehand from the engine rotational frequency or the amount of accelerator pedal treading in It sets up, just before an amount exceeds the NOx absorptance of the NOx absorbent 11.
[0018] Next, actuation of the exhaust emission control device at the time of playback of the uptake filter 7 is explained. It judges whether the uptake filter 7 should be reproduced based on the exhaust gas pressure first detected by the pressure sensor 10. when exhaust gas pressure is higher than the pressure defined beforehand, a lot of exhaust air particles have accumulated on the uptake filter 7, and the uptake filter 7 should be reproduced -- ** -- it judges. conversely, little in the uptake filter 7, when exhaust gas pressure is lower than the pressure defined beforehand -- the exhaust air particle was carried out -- it does not deposit but it is judged that it is not necessary to reproduce the uptake filter 7. Therefore, a pressure sensor 10 functions also as a decision means to judge whether the uptake filter 7 should be reproduced. the uptake filter 7 should be reproduced -- ** -- when judged, a change-over valve 15 is controlled so that exhaust gas flows in the bypass path 13, and the uptake filter 7 is heated at the heating heater 8. If required to burn the exhaust air particle by which uptake is carried out to the uptake filter 7 at this time, air will be introduced from the air-injection valve 9. The exhaust air particle by which uptake is carried out by this to the uptake filter 7 is made to burn, and it is eliminated from the uptake filter 7. From the uptake filter 7, SOx which was sticking to the exhaust air particle is emitted with combustion of an exhaust air particle. However, exhaust gas bypasses the NOx absorbent 11 and flows into the flueway 6 of the downstream of the NOx absorbent 11. For this reason, SOx is not absorbed by the NOx absorbent 11, therefore the fall of the NOx absorptance of the NOx absorbent 11 is prevented.
[0019] In addition, the combustion temperature within a gas column may be gone up instead of using the heating heater 8, exhaust gas with high temperature may be made to flow into the uptake filter 7, and the exhaust air particle by which

uptake is carried out to the uptake filter 7 may be burned. Moreover, if arrange the throttle valve for lessening an inhalation air content in the inhalation-of-air path 3, a throttle valve is extracted at the time of playback of the uptake filter 7, an inhalation air content is lessened and the amount of the exhaust gas which flows in the uptake filter 7 is lessened, the exhaust air particle by which uptake is carried out to the uptake filter 7 will become easy to burn.

[0020] Next, the detail of NOx purification processing of the first operation gestalt is explained with reference to the flow chart of drawing 2 . After supplying HC or CO to the NOx absorbent 11 last time in step S100, it is distinguished whether it is that the time amount t to current is larger (t>t0) than the time amount t0 defined beforehand. When it is t>t0, it judges that it is not necessary to supply HC or CO to the NOx absorbent 11, and processing is ended. on the other hand, when it is t<=t0, HC or CO should be supplied to the NOx absorbent 11 -- ** -- it judges and it is distinguished whether it is larger (AF>AF0) than the air-fuel ratio AF 0 as which it progressed to step S102, and the air-fuel ratio AF in the flueway 6 of the downstream of the current NOx absorbent 11 was determined beforehand. In addition, AF0 is theoretical air fuel ratio. the quantity of HC or CO which HC or CO of a complement is not supplied in the NOx absorbent 11 when it is AF>AF0, but is supplied should be decreased -- ** -- HC of the amount which judged, and increased the quantity of the amount of HC which is going to progress to step S104 and is going to carry out current supply, or CO, and the step S106 smell lever increased the quantity of is injected from a fuel injection valve, and processing is ended. On the other hand, it judges that HC or CO is flowing out of the NOx absorbent 11 when it is AF<=AF0, HC or CO of an amount which decreased the quantity of the amount of HC which is going to progress to step S108 and is going to carry out current supply, or CO, and the step S106 smell lever decreased the quantity of is injected from a fuel injection valve, and processing is ended. When it is AF<=AF0 in step S102, of course, injection of HC or CO may be stopped.

[0021] Next, the detail of regeneration of the uptake filter of the first operation gestalt is explained with reference to the flow chart of drawing 3 . It is distinguished whether it is larger (P>P0) than the exhaust gas pressure P0 as which the exhaust gas pressure P of the upstream of the uptake filter 7 was beforehand determined in step S200. Since a lot of exhaust air particles may accumulate on the uptake filter 7 and an internal combustion engine's exhaust air property may be spoiled, when it is P>P0, A change-over valve 15 is driven. regeneration of the uptake filter 7 should be performed -- ** -- it judging, and so that exhaust gas may bypass the NOx absorbent 11 and may flow in step S202 Next, the heating heater 8 is operated that the exhaust air particle in the uptake filter 7 should be burned in step S204, in order to promote combustion of the exhaust air particle of a step S206 smell lever next, air is injected from the air-injection valve 9, and processing is ended. The exhaust air particle deposited on the uptake filter 7 on the other hand when it is P<=P0 is comparatively little. It is judged that regeneration of the uptake filter 7 was completed when it judged that it is not necessary to perform regeneration of the uptake filter 7 or progressed during activation of regeneration at step S208. Injection of the air from the air-injection valve 9 is stopped at step S208, then, the heating heater 8 is suspended in step S210, a change-over valve 15 is driven so that exhaust gas may flow into the NOx absorbent 11 in step S212, and regeneration is ended.

[0022] Next, the exhaust emission control device of the second operation gestalt of this invention is explained. In exhaust gas, the matter which functions as reducing agents, such as NO, HC, and a fusibility organic substance (SOF), is contained. Therefore, with the first operation gestalt, the above-mentioned reducing agent will flow into the uptake filter 7 at the time of playback of the uptake filter 7, and a lot of oxygen (O2) will be consumed. For this reason, oxygen required to burn the exhaust air particle by which uptake was carried out to the uptake filter 7 runs short. Therefore, burning all the exhaust air particles in the uptake filter 7 takes long time amount. In the time of playback of the uptake filter 7, since exhaust gas does not flow into the NOx absorbent 11, when playback of the uptake filter 7 takes long time amount, it has the problem that the amount of NOx emitted to the downstream of the NOx absorbent 11 increases. Moreover, in order to compensate the oxygen which ran short, it is necessary to increase the amount of the air which makes Lean further an internal combustion engine's air-fuel ratio, or is injected from the air-injection valve 9. In making an internal combustion engine's air-fuel ratio into Lean further, there is a problem that an engine output will decline. Moreover, in increasing the amount of the air injected from the air-injection valve 9, there is a problem that air of a complement may be unable to be injected. Since the air-injection valve has been arranged when an air-injection valve is unnecessary if oxygen furthermore did not run short, a manufacturing cost rises. So, with the second operation gestalt, it prevents that HC, CO, and SOF consume oxygen in an uptake filter.

[0023] As shown in drawing 2 , in the exhaust emission control device of the second operation gestalt, the oxidation catalyst 18 for oxidizing reducing agents, such as NO, HC, and SOF, to the flueway 6 between the engine body 1 and the uptake filter 7 is arranged. Since other configurations are the same as the first operation gestalt, explanation is omitted.

[0024] In order that reducing agents, such as NO, HC, and SOF, may oxidize in an oxidation catalyst 18 according to

the second operation gestalt, the oxygen in the uptake filter 7 is not consumed with these reducing agents at the time of playback of the uptake filter 7. For this reason, the exhaust air particle in the uptake filter 7 can be burned at an early stage in the small amount of oxygen. Therefore, according to the second operation gestalt, the amount of NOx emitted to the downstream of the NOx absorbent 11 at the time of uptake filter playback is stopped low. Moreover, the NOx absorbent 11 is NO NO2 It is made a form and absorbs. With the second operation gestalt, it sets to an oxidation catalyst 18, and NO is NO2. In order to oxidize, except the time of playback of the uptake filter 7, NO of the upstream of an oxidation catalyst 18 is NO2. It flows into the NOx absorbent 11 in a form. Therefore, according to the second operation gestalt, the NOx absorbent 11 becomes easy to absorb NOx. In addition, since NOx purification processing of the second operation gestalt and uptake filter regeneration are the same as the first operation gestalt, explanation is omitted.

[0025] Next, the exhaust emission control device of the third operation gestalt of this invention is explained. Although uptake of the exhaust air particle in exhaust gas is temporarily carried out with the third operation gestalt as shown in drawing 3 , the uptake object 19 as an uptake means to emit an exhaust air particle within a certain period is arranged in a flueway 6. the uptake object 19 of the third operation gestalt -- porosity -- it is -- an exhaust air particle -- the hole of the uptake object 19 -- it is temporarily caught inside. However, within a certain period, it is emitted to the flueway 6 of the downstream of the uptake object 19 by the exhaust gas style. The same NOx absorbent 11 as the first operation gestalt is arranged in the flueway 6 of the downstream of the uptake object 19. Furthermore, the same uptake filter as the first operation gestalt is arranged in the flueway 6 of the downstream of the NOx absorbent 11. Since other configurations are the same as the first operation gestalt, explanation is omitted. In addition, with the third operation gestalt, the bypass path 13 and the change-over valve 15 are not formed.

[0026] Next, an operation of the exhaust emission control device of the third operation gestalt is explained. As mentioned above, the exhaust air particle in exhaust gas is temporarily caught in the uptake object 19. While this exhaust air particle is caught by the uptake object 19, SOx sticks to an exhaust air particle. Then, an exhaust air particle is emitted from the uptake object 19 with SOx. SOx passes the NOx absorbent 11, without being absorbed by the NOx absorbent 11 since it is sticking to an exhaust air particle. Uptake of the exhaust air particle which passed the NOx absorbent 11, and the SOx is carried out to the uptake filter 7. The uptake filter 7 is reproduced when exhaust gas pressure becomes larger than the pressure defined beforehand like the first operation gestalt. Therefore, with the second operation gestalt, the NOx absorptance of the NOx absorbent 11 does not decline by SOx.

[0027] Next, regeneration of the uptake filter of the third operation gestalt is explained with reference to the flow chart of drawing 6 . In addition, since NOx purification processing of the third operation gestalt is the same as the first operation gestalt, explanation is omitted. It is distinguished whether it is larger (P>P0) than the exhaust gas pressure P0 as which the exhaust gas pressure P of the upstream of the uptake filter 7 was beforehand determined in step S300. Since a lot of exhaust air particles may accumulate on the uptake filter 7 and an internal combustion engine's exhaust air property may be spoiled, when it is P>P0, The heating heater 8 is operated. regeneration of the uptake filter 7 should be performed -- ** -- it judging and the exhaust air particle in the uptake filter 7 in step S302 that it should burn Next, in order to promote combustion of the exhaust air particle of a step S304 smell lever, air is injected from the air-injection valve 9, and processing is ended. The exhaust air particle deposited on the uptake filter 7 on the other hand when it is P<=P0 is comparatively little. It is judged that regeneration of the uptake filter 7 was completed when it judged that it is not necessary to perform regeneration of the uptake filter 7 or progressed during activation of regeneration at step S306. Injection of the air from the air-injection valve 9 is stopped at step S306, then, the heating heater 8 is suspended in step S308, and regeneration is ended.

[0028] Next, the exhaust emission control device of the fourth operation gestalt of this invention is explained. As shown in drawing 4 , with the fourth operation gestalt, the bypass path 20 which bypasses the uptake filter 7 from the flueway 6 of the upstream of the uptake filter 7 has branched. The bypass path 20 joins the flueway 6 between the uptake filter 7 and the NOx absorbent 11. The change-over valve 22 for making exhaust gas flow into either the uptake filter 7 or a bypass path is attached in a part for the tee 21 from the flueway 6 of the bypass path 20. Since other configurations are the same as the first operation gestalt, explanation is omitted.

[0029] Next, actuation of the exhaust emission control device of the fourth operation gestalt is explained. Actuation of the exhaust emission control device under NOx purification is the same as the first operation gestalt. While a change-over valve 22 is controlled so that exhaust gas flows into the bypass path 20 when the uptake filter 7 should be reproduced, the uptake filter 7 is heated at the heating heater 8, and air is injected from the air-injection valve 9 if needed. The exhaust air particle in the uptake filter 7 is made to burn by this, and it is eliminated.

[0030] By the way, with the fourth operation gestalt, the exhaust gas which flows directly from the engine body 1, and the exhaust gas discharged from the uptake filter 7 are contained in the exhaust gas which flows into the NOx absorbent 11. When the air-fuel ratio of the exhaust gas which flowed into the NOx absorbent 11 temporarily is Lean, SOx which

seceded from the exhaust air particle at the time of playback of the uptake filter 7 absorbs to the NOx absorbent 11, and the NOx absorptance of the NOx absorbent 11 declines. So, with the fourth operation gestalt, the air-fuel ratio of the exhaust gas which flows into the NOx absorbent 11 makes rich the air-fuel ratio in the exhaust gas discharged by the internal combustion engine according to theoretical air fuel ratio or the air-fuel ratio of exhaust gas discharged from the uptake filter 7 so that it may become rich. Therefore, theoretical air fuel ratio or since it is rich, as for SOx, the air-fuel ratio of the exhaust gas which flows into the NOx absorbent 11 is not absorbed by the NOx absorbent 11. Therefore, according to the fourth operation gestalt, the fall of the NOx absorptance of the NOx absorbent 11 is controlled. In addition, it is made to control the air-fuel ratio in the exhaust gas discharged by the internal combustion engine so that the air-fuel ratio of the exhaust gas discharged from the NOx absorbent 11 turns into theoretical air fuel ratio, namely, as [HC] it is not contained in the exhaust gas discharged from the NOx absorbent 11.

[0031] Next, the detail of regeneration of the uptake filter of the fourth operation gestalt is explained. In addition, since NOx purification processing of the fourth operation gestalt is the same as the first operation gestalt, explanation is omitted. It is distinguished whether it is larger (P>P0) than the exhaust gas pressure P0 as which the exhaust gas pressure P of the upstream of the uptake filter 7 was beforehand determined in step S400. Since a lot of exhaust air particles may accumulate on the uptake filter 7 and an internal combustion engine's exhaust air property may be spoiled, when it is P>P0, A change-over valve 22 is driven. regeneration of the uptake filter 7 should be performed -- ** -- it judging, and so that exhaust gas may bypass the uptake filter 7 and may flow in step S402 Next, the heating heater 8 is operated that the exhaust air particle in the uptake filter 7 should be burned in step S404, in order to promote combustion of the exhaust air particle of a step S406 smell lever next, air is injected from the air-injection valve 9, and it progresses to step S408. The exhaust air particle deposited on the uptake filter 7 on the other hand when it is P<=P0 is comparatively little. It is judged that regeneration of the uptake filter 7 was completed when it judged that it is not necessary to perform regeneration of the uptake filter 7 or progressed during activation of regeneration at step S416. Injection of the air from the air-injection valve 9 is stopped at step S416, then, the heating heater 8 is suspended in step S418, a change-over valve 22 is driven so that exhaust gas may flow into the NOx absorbent 11 in step S420, and regeneration is ended.

[0032] At step S408, it is distinguished whether it is that the air-fuel ratio AF in the flueway 6 of the downstream of the current NOx absorbent 11 is larger (AF>AF0) than the air-fuel ratio AF 0 defined beforehand. In addition, AF0 is theoretical air fuel ratio. the quantity of HC which HC of a complement is not supplied in the NOx absorbent 11 when it is AF>AF0, but is supplied should be decreased -- ** -- HC of the amount which judged, and increased the quantity of the amount of HC which is going to progress to step S410 and is going to carry out current supply, and the step S412 smell lever increased the quantity of is injected from a fuel injection valve, and processing is ended. On the other hand, it judges that HC is flowing out of the NOx absorbent 11 when it is AF<=AF0, HC of the amount which decreased the quantity of the amount of HC which is going to progress to step S414 and is going to carry out current supply, and the step S412 smell lever decreased the quantity of is injected from a fuel injection valve, and processing is ended. Injection of HC may be stopped when it is AF<=AF0 in step S408, of course.

[0033]

[Effect of the Invention] When an uptake means is reproduced most according to an eye and the second invention, SOx discharged from an uptake means does not flow into an NOx absorbent. For this reason, SOx is not absorbed by the NOx absorbent. Therefore, the fall of the NOx absorptance of an NOx absorbent is controlled.

[0034] According to the third and the fourth invention, SOx flows into an NOx absorbent, where an exhaust air particle is adsorbed. For this reason, SOx passes an NOx absorbent with an exhaust air particle, and SOx is not absorbed by the NOx absorbent. Therefore, the fall of the NOx absorptance of an NOx absorbent is controlled.

[0035] When an uptake means is reproduced according to the fifth and the sixth invention, theoretical air fuel ratio or rich exhaust gas flows [an air-fuel ratio] into an NOx absorbent. Theoretical air fuel ratio or since it is rich, as for the air-fuel ratio of the exhaust gas in an NOx absorbent, SOx is not absorbed by the NOx absorbent. Therefore, the fall of the NOx absorptance of an NOx absorbent is controlled.

[Translation done.]

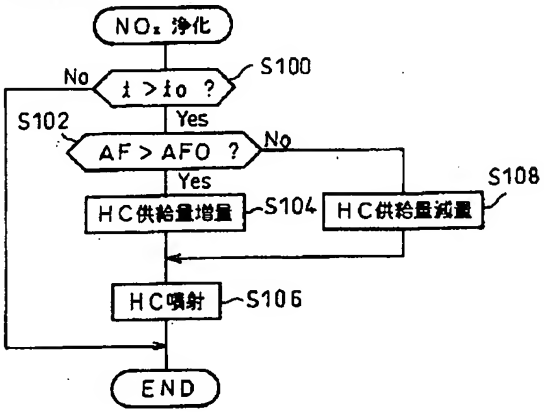
* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

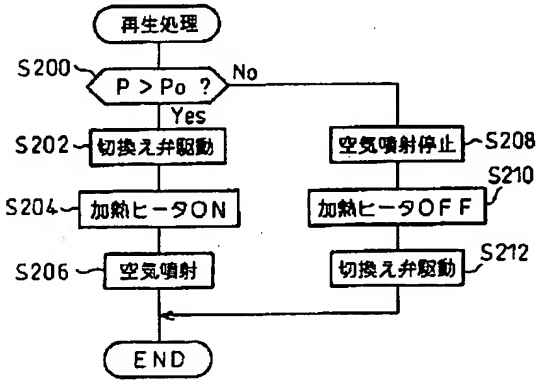
[Drawing 2]

図 2



[Drawing 3]

図 3



[Drawing 1]

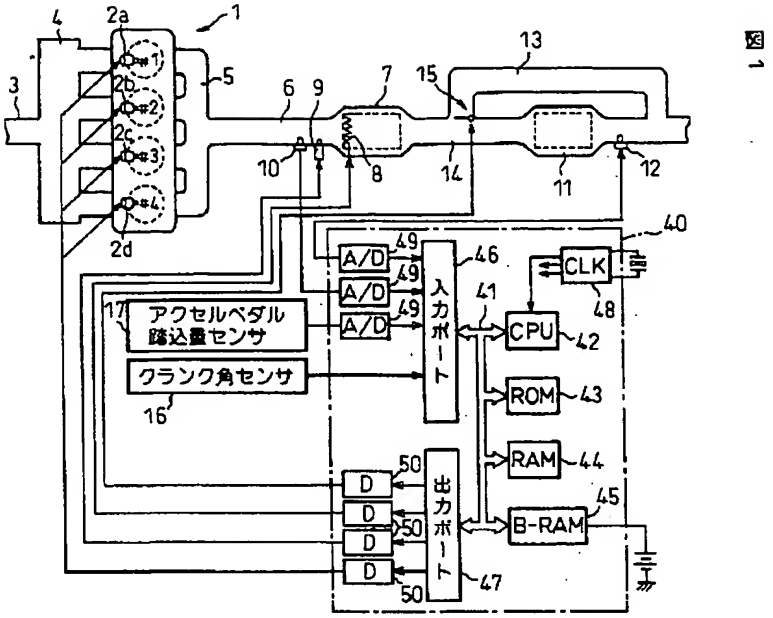


図1

[Drawing 4]

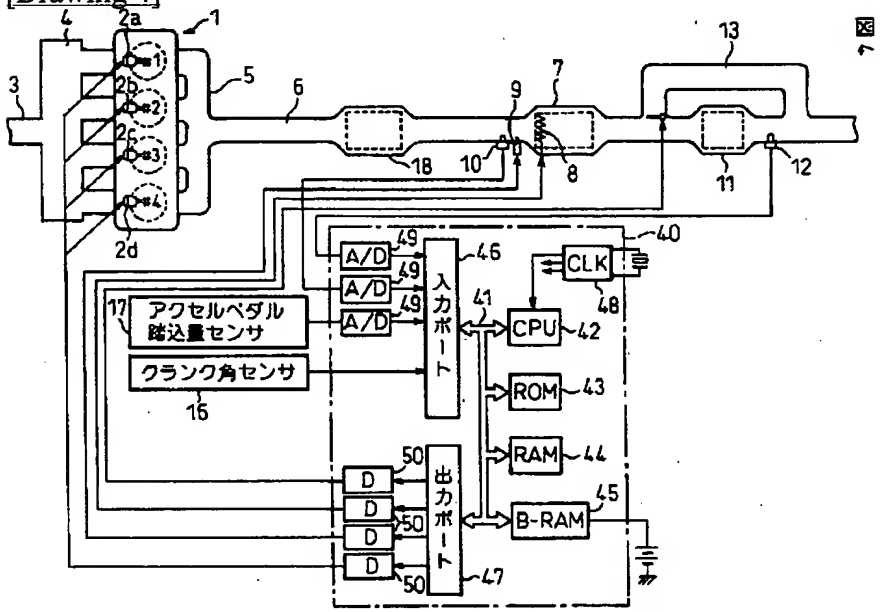


図7

[Drawing 5]

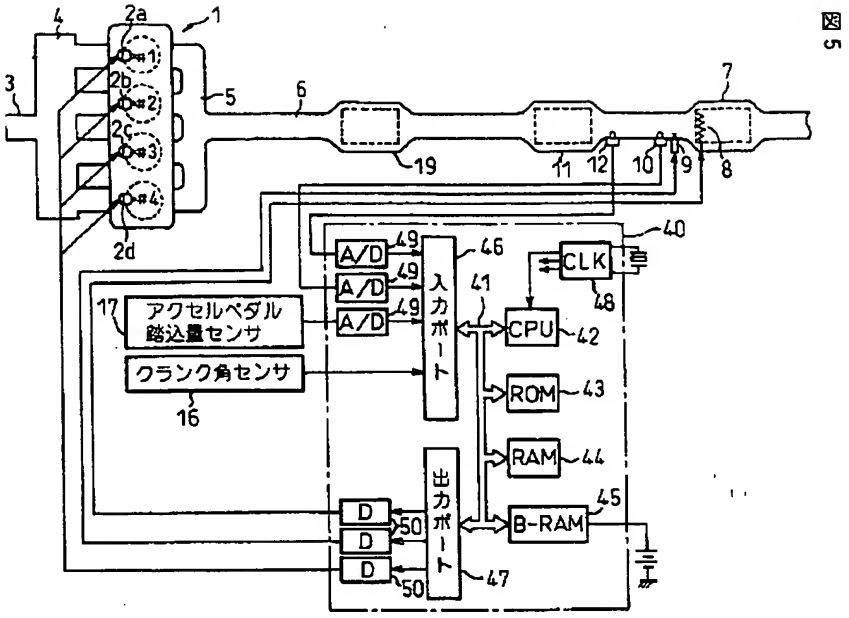
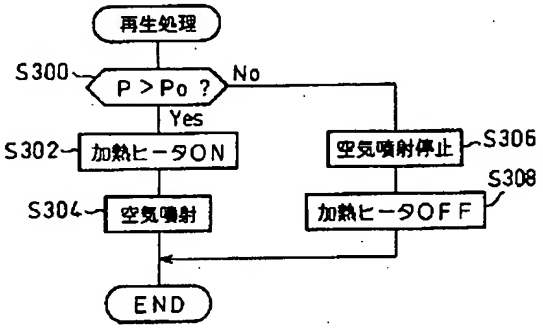


図5

[Drawing 6]

図6



[Drawing 7]

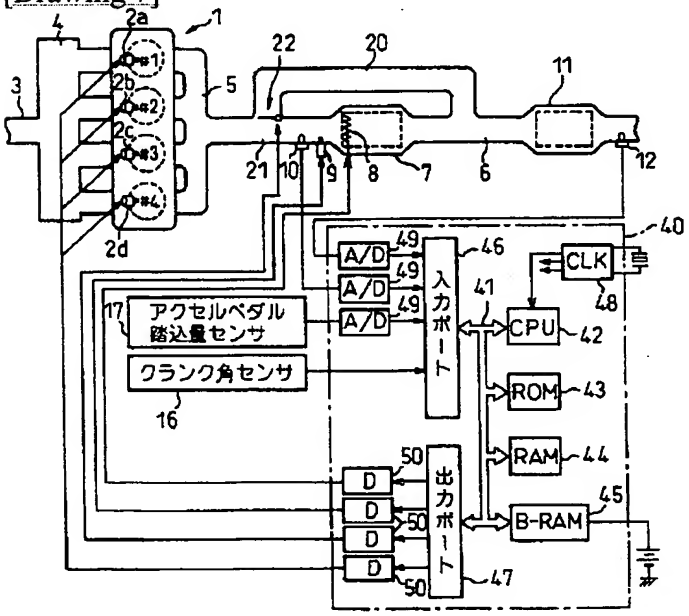
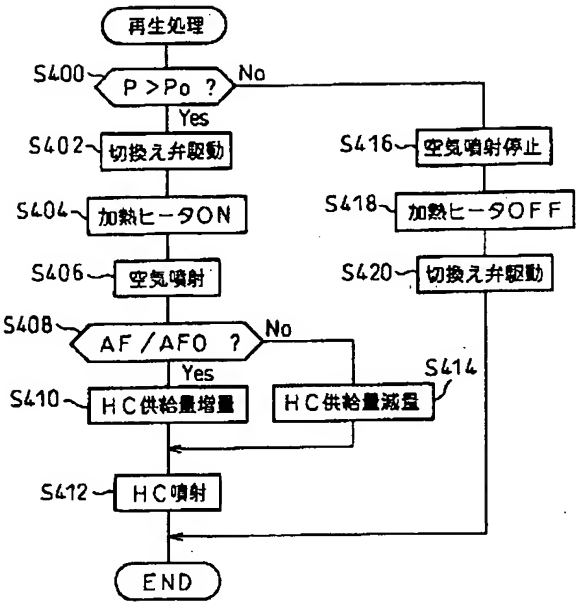


図7

[Drawing 8]

図8



[Translation done.]